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May 5, 1956

VOL. 69, NO. 18 PAGES 273-288

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

Guarding Tarantula's Young

See Page 282

A SCIENCE SERVICE PUBLICATION

# Kodak reports to laboratories on:

**film you can switch from black to white and back again (and again) . . . a movie camera for high altitudes and latitudes . . . bloody business at Fall River**

## We pre-expose, you de-expose and re-expose

Great reputations for cleverness around the laboratory have been built by that happy breed who carry around scraps of information like the following to bring forth at moments of decision:

There is a film (called *Kodak Autopositive Film* and sold by Kodak Industrial and Graphic Arts dealers) which comes from the factory with a stupendous latent blackness that can be wiped clean with yellow light and be put back with white light. The density it gives, if developed and fixed without exposure, is 6, which means that light passing through is attenuated by a factor of 1,000,000. If before processing, however, 3,000 foot-candles of illumination fall for two minutes on the film through a piece of *Kodagraph Sheeting, Yellow*, the same development and fixation leave it almost as clear as window glass. A briefer exposure without the yellow sheeting restores the latent density. One can swing back and forth thus dozens of times. The principle is simply that radiation of wavelength shorter than 420 mμ builds latent density and radiation from 420 mμ to 750 mμ cuts it.

## K-100 in the cold

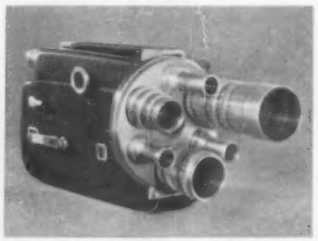
"Walt Disney Productions' Antarctic film will soon be shown on the Disneyland and Mickey Mouse Club TV Shows and will be released as a full-length movie which can be seen at your local movie theatre."

Printing the above sentence seems a fair price to pay for the privilege of saying that the *Cine-Kodak K-100 Cameras* of the Disney crews in Antarctica are functioning properly at −45F without the electric blankets which far costlier 16mm movie cameras require.

Actually, nowadays, smart outfits like the Disney organization find out from an environmental chamber test in advance just what they can or cannot expect from equipment being considered for strenuous duty. Then you hear from them only if the equipment failed to perform as in the test, in which case you hear plenty.

We could attribute the low-temperature performance of this camera to the extra care lavished by aging craftsmen on each *K-100* that leaves their devoted hands. A more credible explanation is afforded by the nylon gears, nylon pulldown cam, and the ball-bearing pulldown mechanism. The pre-stressed spring motor is also of some pertinence to the matter.

The *K-100* is now made in a turret model like this:



Those smaller tubes opposite each of the three *Kodak Cine-Ektar Lenses* contain their respective viewfinder telescope objectives. No Disney tie-in, unfortunately, because this model came out months after the Mickey Mouse emissaries shoved off.

***Performance of the* K-100 *in the cold should be just as exploitable at high altitudes as at high latitudes. Data recording, for example? A Kodak dealer is nearby***

## Truly blood

John D. MacPhail likes *p,p'-Benzylidenebis(N, N-dimethylaniline)* (Eastman 3620) better than the classic benzidine for the identification of bloodstains because he finds it more specific. Doing business as Forensic Science Service (144 Third Street, Fall River, Mass.), Mr. MacPhail knows how to keep legal evidence intact. He moistens a filter paper with 0.1N saline and merely presses it against an edge of an old stain suspected as blood. Then he touches the paper (not the stain) with one glass rod dipped in a 1:240 solution of Eastman 3620 in 40% acetic acid. A second time he touches it with another glass rod dipped in an 11:30 solution of sodium perborate in 40% acetic acid. If the paper turns blue-green after the second touch, Mr. MacPhail knows the spot is truly blood. Such colored oxidants as potassium permanganate turn the reagent blue-green *before* contact with sodium perborate. Perhaps something in the bloodstain releases from the sodium perborate the oxygen to oxidize our compound to its far better known form, malachite green, a common dyestuff named for its color resemblance to the brilliant copper mineral malachite.

The first supply of our *leuco*-malachite green that Mr. MacPhail laid in worked fine down to the last grain; presto, twenty years of human violence had gone by and it was time to reorder. (The price is $2.20 for 5 g.) The second lot we supplied worried Mr. MacPhail. It was green enough in the stock solution to invite sarcastic questions from lawyers. Our man who signed the papers to manufacture the first batch is still on the job, however. He suggested that Mr. MacPhail add a little sodium bisulfite to redress the redox balance *leuco*wards. Now Mr. MacPhail reports he is all set again.

*Yes, and if you want the balance the other way we can supply* Malachite Green Oxalate (*Eastman 1264*). *Among 3500-odd organics, the chance of finding what you want is encouraging. All from Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).*

Price quoted is subject to change without notice.

**This is one of a series of reports on the many products and services with which the Eastman Kodak Company and its divisions are . . . *serving laboratories everywhere***

Kodak
TRADE MARK

BIOCHEMISTRY

# Cracking Life's Code

**Find evidence that each of the millions of cells of a living organism knows its destiny. Dissociated skin cells can reorganize to start a feather.**

➤ THE CODE for the organization of life from a microscopic egg to a human being will soon be broken, it appears from a report by Dr. Paul A. Weiss of the Rockefeller Institute for Medical Research, New York, at the meeting of the National Academy of Sciences in Washington.

If present research findings continue to keep their promise, he said, "the prospects for a major advance in the cryptography of the mysterious code of higher organization of living systems seems very good indeed."

At the moment of its creation or very soon after, each of the millions of cells that make up a living organism seems to know its destiny. It knows whether it will become part of an eye or a leg or a chicken feather. It knows, also, how to find and group itself in proper arrangement with other like cells to make up the living fabric of eyes, legs, feathers, skin and so on.

Dr. Weiss and associates have taken cartilage cells from young chick embryos and, by treating them with the enzyme, trypsin, dissociated them so they no longer made up a tiny mass of cartilage tissue. They did this with cells from a limb bud and with cells from the sclera, or white coat, of the eye.

The cells from limb-bud and from eye-coat cartilage all looked alike when dissociated. There was nothing to distinguish one from the other.

When, however, they were put at random into tissue culture and reared under identical conditions, the cells from limbs combined to form the massive bodies characteristic of limb cartilage. Those from the sclera joined in the shape of a flat plate and grew as such.

"They thus had retained," Dr. Weiss said, "upon their isolation not only a general cartilaginous quality, but quite specific cues as to how to arrange themselves and their products geometrically when reassembled in numbers."

The formation of a feather, Dr. Weiss pointed out, "requires a complicated and strictly coordinated pattern of movements and growth of the tributary cells."

Nevertheless, cells from a chick embryo dissociated or separated from their native site and from each other days before feather germs had appeared got together and made feathers.

"Our experiment," Dr. Weiss said, "implies that a random assortment of skin cells that never had been part of a feather can, as a group, set up conditions—a 'field'—which then will cause members of the group to move and grow in concert and in accordance with a typical pattern of organogenesis."

By continuing to study the way cells from disrupted organs can reintegrate themselves, scientists may learn the "cues" the cells get for assembling themselves into living tissue and for functioning in special ways. However, "the information is in code and our purpose must remain to decode it," Dr. Weiss noted.

"There is," he said, "continuity and consistency in nature, after all, if only we strive hard to find it."

Dr. Weiss spoke at a symposium on biomolecular organization and life processes. This is a field of research dealing with macromolecules, or large molecules, and their aggregation into living, functioning units.

Better understanding of the mechanism of heredity and of viruses and their activities is coming from such studies.

Macromolecules have been studied in solution by Dr. Paul Doty of Harvard University, who reported his findings.

Dr. Cecil E. Hall of Massachusetts Institute of Technology, Cambridge, showed what they look like when seen with the electron microscope, and Dr. Francis O. Schmitt of the same institution described patterns of their interaction in relation to cell function. Dr. Schmitt has been studying macromolecular systems in relation to genes and chromosomes.

Macromolecules in relation to viruses were discussed by Dr. Robley C. Williams of the University of California at Berkeley.

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PSYCHOLOGY

## Boredom of Middle-Aged Married Seen as New

➤ MIDDLE-AGED BOREDOM between married couples is a product of recent years, Dr. Lemo Rockwood of Cornell University declared at a Family Life Conference in Ithaca, N. Y.

It could not have been much of a problem when most people did not live beyond 40 years of age, he pointed out.

He suggested building up a "mutual interest bank" as preventive of the condition. The couple, while young, should store in this bank the hobbies, travel and enterprises they had no time for when life centered on children and the family.

"There is a fine but vital distinction," he said, "between being adjusted to marriage and having a marriage which adjusts to the changing patterns of life."

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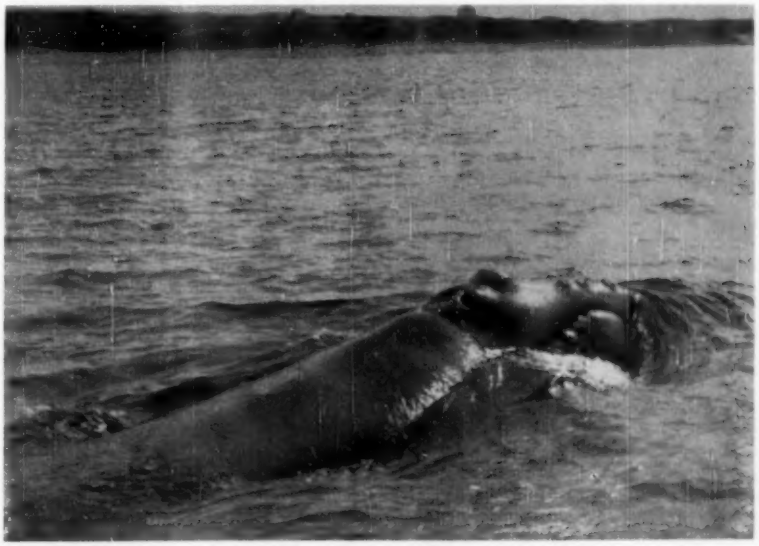

*RIGHT WHALE NEAR ATLANTIC COAST—Close-up view of a right whale near Menemsha, Mass. Most of the head and part of the body is above water. The blow holes on top of the head are closing for the next dive. Barnacles and other parasites are clinging to the head. The whale's closed mouth is reminiscent of medieval helmets. The right whale, the only species entitled to the name of whale, is quite rare. Sounds made by this 35-foot specimen were recorded by scientists at Woods Hole Oceanographic Institution and added to their collection of sounds heard in the ocean.*

ARCHAEOLOGY

# Ancient Man's Teeth

➤ PREHISTORIC MAN cleaned his teeth.

Evidence of this habitual use of cleaning agents on the teeth of ancient skulls was reported to the British Association for the Advancement of Science by Dr. E. K. Tratman, archaeologist and dental surgeon.

Such evidence, although rarely reported, is probably quite common in the remains of teeth of ancient man, Dr. Tratman indicates. It would be easily missed if the scientists studying the teeth were not familiar with the type of damage caused by various cleaning methods.

Toothpicks, when used habitually, leave their own unmistakable marks on teeth. It is even possible, Dr. Tratman said, to deduce whether the individual who used the toothpick was righthanded or lefthanded in life.

Prehistoric man had cavities in his teeth just as does his modern descendant, but any one prehistoric man had fewer cavities. Even the pattern of their location was different. In prehistoric man, the cavities occurred almost exclusively between the teeth starting at the gum line or below, and they did not bother him until middle or later life.

In Britain today, most cavities occur on the biting surface of the tooth or between the teeth above the gum line, and each individual has a large number of cavities.

Pyorrhea, the dental disease that causes the gums to recede and the teeth to loosen, was rife among prehistoric Englishmen, Dr. Tratman reported. It is probable, he reasons, that some of the single teeth found at prehistoric sites were lost by the ancient owner because of pyorrhea.

Prehistoric man had little need for the braces modern dentists have learned to use to straighten teeth. When his teeth did grow crooked, there was some simple cause such as a supernumerary tooth.

Altogether, there is a great deal that prehistoric man's teeth can tell us about his life, diet, habits and diseases. The teeth's form and fissure patterns can even reveal from what racial group he came.

Science News Letter, May 5, 1956

OPTICS

# Standard Color Gauge

➤ A DEFINITE YARDSTICK for measuring colors has been provided for the first time by Walter R. J. Brown of Eastman Kodak's Research Laboratories, Rochester, N. Y.

As a result, American women should be able to match colors more readily for dresses, wallpaper and furniture. Mr. Brown was awarded the Adolph Lomb Medal of the Optical Society of America for his studies leading to an exact way to term shades of color.

Men are just as good as women in picking out the right shade to match a particular color sample, Mr. Brown's tests showed. Twenty-two basic colors were used and a total of 17,000 matches were made.

From these tests, scientists now know how much tolerance, or "give," can be permitted in selecting shades of color.

Mr. Brown's study has revolutionary implications for color film and television manufacturers, since it can help prevent harsh contrasts and shows the limits of hue, saturation and brightness that can be used.

Textile and home appliance manufacturers now have a nation-wide standard so that finishes for different parts of the same product can be applied in different sections of the country and be identical when the parts are assembled.

Automatic computing machines can be used to help check the shades of color and to aid in making exact decisions about color quality.

Some idea of the complexity of the problem Mr. Brown tackled is indicated by the fact there are more than 20,000,000 different colors that may be seen with normal vision. His results are expected to be made the basis of an international agreement on a method for specifying color differences and tolerances.

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PHYSICS

## Miniature Galaxies Made in Laboratory

➤ MINIATURE GALAXIES are being made in a laboratory by firing chunks of ionized matter at each other at speeds up to 140 miles per second in a strong magnetic field.

Pictures of self-luminous patterns thus formed were shown at the American Physical Society meeting in Washington by Drs. Winston H. Bostick of the University of California, Livermore, and David Finkelstein of Stevens Institute of Technology and New York University.

Under certain conditions, spiral patterns resembling galaxies can be obtained. Thus the scientists may be duplicating on a small scale one process in the formation of spiral galaxies, the interaction and condensation of ionized matter.

A small magnetic gun no larger than a shirt button is used to propel the ionized matter, known as plasma, which consists of both positive ions and electrons, tiny negative particles. When fired from the gun in a strong magnetic field, the plasma appears to form a plasma-magnetic entity termed a plasmon.

Two plasmons shot at each other across a magnetic field "will either repel or attract, depending on whether they pass on the right (American style) or the left (English style)," the scientists said. The attraction and repulsion are reversed if the magnetic field is reversed.

The plasmons behave rather like elementary particles on a large scale, and are a valuable laboratory tool for studying basic astrophysical processes.

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PHYSICS

## Anti-Matter Galaxies May Exist Somewhere

➤ UNIVERSES of anti-matter, long fixtures in science fiction plots, were suggested to the American Physical Society meeting in Washington.

Possible existence of galaxies of negative matter was proposed by Dr. Clyde Wiegand of the University of California, Berkeley, one of the scientists who participated in discovery of the anti-proton last October.

Although Dr. Wiegand emphasized his idea of anti-worlds is purely speculative, he said the anti-proton's discovery suggested the possibility, which appeals to physicists because nature tends to be symmetrical.

Where there is one atomic particle, for instance, there is often another of identical mass but opposite properties. The anti-proton is the proton's twin, except it has opposite electrical charge.

The universe may consist of equal parts of matter as we know it and anti-matter, Dr. Wiegand speculated. If so, however, it probably cannot be verified one way or another.

A collision between galaxies of matter and anti-matter probably would be difficult to distinguish from collisions of two ordinary galaxies, which astronomers have recently discovered and are now studying.

Energy in enormous quantities would be released in the annihilations resulting from matter and anti-matter galaxies clashing. If nearby, the explosion would be spectacular.

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PHYSICS

## Better Combination of X-ray and Microscope

➤ AN X-RAY-MICROSCOPE combination of simpler design and less expensive than those presently in use has been designed at the National Bureau of Standards.

An X-ray microscope, Drs. R. A. Schrack, R. C. Placious and L. Marton explained, provides an enlarged photographic image of small objects, useful in medical and physical research. Its advantages are that all areas of the specimen under investigation are always in focus and that living specimens can be examined without harm.

The simplified device uses, for the first time, the principle of field emission of electrons, or negative particles, in an electron optical system, the American Physical Society meeting in Washington was told.

Source of the electrons is less than a fifty-thousandth of an inch in radius. The electrons are focused to a very minute spot on a gold target, where they produce X-rays. The specimen is placed between the X-ray source and photographic film so that it will cast an enlarged shadow.

The expected resolving power of the field emission X-ray microscope is about a million lines per inch.

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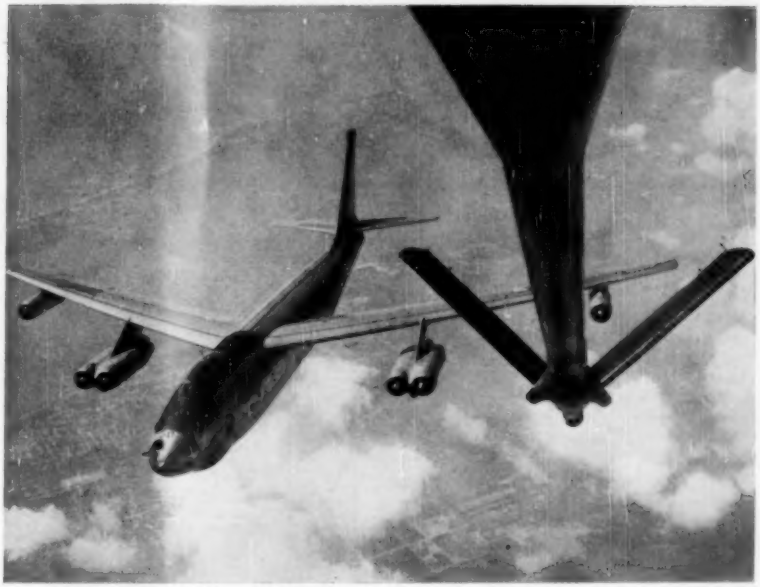

*REFUELING—This is the giant fuel boom of a flying tanker about to "fill 'er up" for a jet bomber. Inside the line leading to the boom is an instrument developed by General Electric scientists. It can gauge enough fuel in one minute to send an automobile around the world.*

MATHEMATICS

# Build Intelligent "Brain"

➤ MAN can build an electronic "brain" more intelligent than himself.

The know-how for making a computing machine solve problems beyond man's present mental capacity is available now. Intellectual power can be amplified as physical power is, the British scientist Dr. W. Ross Ashby contends.

Although the electronic computer might not be able to play chess, its ability to amplify intelligence could solve some of the world's social and economic problems.

"Success in solving these problems is a matter of some urgency," Dr. Ashby states. "We have built a civilization beyond our understanding and we are finding that it is getting out of hand."

Looking for exceptional persons with high I.Q.'s is no solution, since those rating over 150 are quite rare. Man's intellectual powers are thus as bounded as those of his muscles.

By building machines, however, man has learned to amplify this muscle power 10,000 times. If the present-day brain worker had as powerful an intelligence amplifier, he would be able to bring to his problems an I.Q. of a million.

To develop intellectual power in this way, man must build devices that, given a little information, will supply a lot.

Generating new ideas is no difficulty, Dr. Ashby says, since a kaleidoscope gives a "profusion" of them. Discriminating or selecting among them is what makes genius remarkable.

Getting an answer to a problem is essentially a matter of selection, Dr. Ashby says, and selection can be amplified. By dividing the selection process into two stages, a computing machine with a selection amplifier can be made more discriminating than the man who built it.

Dr. Ashby does not estimate exactly how long such a machine would take to provide answers. The upper limit, he calculates, is "forbiddingly high," but the lower limit is "reassuringly low."

His suggestions for building an intelligence-amplifier are made in "Automata Studies," edited by Drs. Claude E. Shannon and John McCarthy and published by the Princeton University Press. (See page 284.)

In the same volume, Atomic Energy Commissioner Dr. John von Neumann of the Institute for Advanced Study, Princeton, N. J., shows how it is possible to construct large and complex automatic computers that will operate reliably even though the component parts are unreliable.

Also described in the book are universal computers, which present machines would be if given, for example, a means of asking for more punched cards and for return of cards it has already punched.

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PHYSICS

# Nobelists Study Hydrogen

**Energy levels of the simplest atom, hydrogen, are being probed with radio waves in continuing studies by the two most recent Nobel Prize winners in physics.**

➤ THE TWO most recent Nobel Prize winners in physics, Drs. W. E. Lamb of Stanford University, California, and Dr. P. Kusch of Columbia University, New York, reported their most recent attempts to learn about the hydrogen atom's structure at the American Physical Society meeting in Washington.

Previous studies of the same subject brought their joint Nobel award in 1955. Both now find their recent measurements do not agree exactly with theory, but they expect differences will be explained by further tests.

Both are using radio waves to learn about the energy levels of the hydrogen atom, which consists of an electron (very light negatively charged particle) whirling around a proton (positively charged particle about 1,850 times heavier than the electron).

Dr. Lamb explained his work as follows: When hydrogen atoms in a gas at low pressure are bombarded with high-energy electrons, they pick up energy, putting them in what physicists call an "excited state." They return to a lower state by giving off light, some of which is visible, some of which is ultraviolet.

There are several different excited states of hydrogen resulting from the electron barrage. Hydrogen atoms reaching each of these states remain there for a definite time and give off a particular wavelength of light when they fall back to the original state. The number of hydrogen atoms in each state determines the brightness of the light so emitted.

By applying radio waves to the excited hydrogen atoms, the brightness of the visible or ultraviolet light given off can be changed. From the frequency of the radio waves causing the changes, the energy differences of the levels can be determined.

Preliminary measurements, Dr. Lamb said, are in "rough agreement" with theory.

The energy levels of excited hydrogen atoms are also being investigated by Dr. Kusch, who is studying relatively long-lived, or metastable, states. Of the various metastable states that hydrogen atoms attain, some levels last much longer than others.

Dr. Kusch is investigating the energy difference between two minutely spaced sublevels of metastable hydrogen, both of the ordinary variety and of heavy, or double-weight, hydrogen. He is determining the energy with which these two kinds of hydrogen interact with the magnetic field produced at the nucleus by the circling electron.

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PHYSICS

# Fission Understood Soon

➤ ESSENTIAL FEATURES of the splitting of uranium atoms to release large amounts of energy, now a mystery despite atomic bombs and piles, will be understood within a year.

Knowing the basic mechanism of fission is of "prime importance" to the atomic energy field, Dr. D. J. Hughes of Brookhaven National Laboratory, Upton, N. Y., told the American Physical Society meeting in Washington.

Release of previously secret information at the Geneva Atoms-for-Peace Conference last summer, he said, "greatly advanced" understanding of the fission process, and should lead to solving the problem very soon.

Basic question being studied at Brookhaven and other laboratories throughout the world is whether, at the very moment a uranium atom splits, its break-up is a complicated or a simple process. Dr. Hughes said Brookhaven experiments indicate fissioning is a simple mechanism, but that explaining the "several hundred distinct products" produced from the splitting is then difficult.

Since discovery of fission in 1939, Dr. Hughes said, scientists have thought the process was one in which the energy that a uranium nucleus gains when hit with a neutron appears as heat, that is, very complicated motions of the nuclear particles. If this is so, then fission would take much less time, measured in tiny fractions of a second, than present experiments indicate.

Now scientists believe the energy transferred to uranium by a neutron changes the shape of the nucleus rather than adding heat to it.

Evidence for this is that only neutrons of particular energies are effective in causing fission.

A blending of the complicated and simple picture is the one Dr. Hughes expects will account for all observed phenomena relating to fission.

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## •RADIO

**Saturday, May 12, 1956, 2:05-2:15 p.m. EDT**

**"Adventures in Science" with Watson Davis, Director of Science Service, over the CBS Radio Network. Check your local CBS station.**

**Stanley Ruttenberg, assistant program officer of the U. S. National Committee for the International Geophysical year, will discuss "Discoveries in Our Atmosphere."**

VETERINARY MEDICINE

## Dwarf Cattle Increasing Fast

➤ THE NUMBER of dwarf cattle being born is increasing so fast that soon one beef calf out of about every seven may be a dwarf, according to the American Veterinary Medical Association in Chicago.

Dwarfism is inherited. To eliminate it, breeding cattle carrying the dwarf genes must be identified. No completely effective, economical method for doing this has been developed, but an X-ray technique now being studied shows promise. Chief difficulty with the technique is lack of a standard means of interpreting the X-ray.

Everett J. Warwick, head of the U. S. Department of Agriculture's cattle research section, predicts dwarfism will continue to be a problem for the remainder of the century.

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EMBRYOLOGY

## Warns on Pinpointing Special Cancer Cause

➤ A WARNING against pinpointing the start of cancer to a particular chemical or a virus or even genes was issued by Dr. Johannes Holtfreter of the University of Rochester, N. Y., at the meeting of the National Academy of Sciences.

Just as the season and the condition of the soil when a farmer sows his seed are important for harvesting a crop, so the time and the condition of the host organism are important for development of cancer from a cancer-causing stimulus.

Cancer-causing chemicals start cancerous growth of various kinds when applied, for example, to the tadpole stage of an amphibian such as a frog. When acting during early embryonic stages before the tadpole stage, however, these same chemicals induced the formation of normal structures such as those that will develop into ears, glands and kidneys, Dr. Holtfreter reported.

His studies were undertaken to help answer some "crucial" questions in embryology. To what an extent does an external stimulus determine a specific reaction from a living organism? Is the outcome due to the kind of stimulus or to the special way some part of the living organism responds?

The situation is so complex, Dr. Holtfreter believes, that much more fundamental knowledge is needed before scientists can tell about the start of cancer.

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*ATTACKING CANCER—Prof. Mitchel Weissbluth handles the controls of a new "cancer gun" at Stanford Medical School, San Francisco. Patricia Steed is visible in the patient's chair through a three-inch window of lead glass. At right is the gun, a six-million-volt linear electron accelerator, which provides high energy X-rays for treating deep-seated tumors. The accelerator and its housing were built with funds from the American Cancer Society, the U. S. Public Health Service and the James Irvine Foundation.*

BIOCHEMISTRY

# Birth Shock Absorbers

➤ BABIES are helped to survive the birth shock of change to a new environment by a system of chemical shock absorbers. These are normally supplied by each infant's liver.

In the future, scientists may be able to provide some of the chemical birth shock absorbers for babies who have trouble breathing for a few hours after birth.

Discovery of the chemical birth shock absorber system was announced by Dr. Claude A. Villee and associates of Harvard Medical School and Boston Lying-In Hospital, Boston, at the meeting of the Federation of American Societies for Experimental Biology in Atlantic City, N. J.

"During the birth process," Dr. Villee pointed out, "the infant needs a large amount of energy, and needs it in a hurry, to keep him going. He is not feeding in these early hours as there is no way he can get food from his mother and the nourishment he received through the placenta has been cut off."

Just a few days before birth, a sudden increase in chemical activity is noted in the liver. Enzymes that have been relatively quiet until then suddenly spring into action. The enzymes enter into a series of 12 chemical reactions with body sugars to form pyruvic acid, a building block of fat.

This activity of sugar storage continues until birth. At that point, the process is reversed as other enzymes go to work in a series of six additional reactions to release the stored energy and convert the sugars to fats in the process.

The stored sugar material, or glycogen, is rapidly used up in the first few hours after birth and provides the energy demands in the absence of food. When the adjustment has been completed the glycogen level returns to normal and production of fats resumes in an orderly fashion.

"It is at this point," Dr. Villee said, "the liver starts an aging process which will continue for the duration of life. But the system of chemical shock absorbers it has produced has enabled the infant to adjust to his new surroundings and survive."

Although rats were used in the research, Dr. Villee described the process as being identical to that experienced in humans. Associated with Dr. Villee were Drs. D. D. Hagerman, R. Kimmelstiel, J. M. Loring and F. M. Wellington.

Science News Letter, May 5, 1956

VIROLOGY

## Attack Virus Before It Forms New Particles

➤ TO STOP INFLUENZA, mumps or other virus disease, you have to attack it chemically before the virus reproduces, Dr. Frank L. Horsfall Jr. of the Rockefeller Institute for Medical Research, New York, has discovered.

The cellular process leading to reproduction of viruses starts in a latent period considerably before new virus particles emerge. Chemicals stop the virus reproduction when given at this stage, Dr. Horsfall found in laboratory experiments, but they do not stop reproduction given after this point, he reported to the National Academy of Sciences meeting in Washington.

The rate at which viruses reproduce varies considerably. New particles of mumps virus do not appear before 24 hours when growing in the laboratory. Influenza A and B viruses and Newcastle virus, a poultry disease that humans can get, produce new particles in less than three hours.

Virus particles move from the inside of the cell to the surrounding fluid in about one hour. The cell wall is not a serious barrier to new particles once they are formed.

When virus particles are adsorbed, or attached, to red blood cells, the red cells drop to the bottom of a tube in a kind of sandwich, or in doublets, as Dr. Horsfall called it, with the virus particle between each two red blood cells.

Non-infectious virus particles can accumulate as well as infectious ones, and by their very numbers can affect the cell they are in, even if they do not cause infection.

Science News Letter, May 5, 1956

AGRICULTURE

## Hot Water Bath Makes Cotton Seeds Sprout

➤ HOT WATER BATHS have solved an agricultural problem in California.

High-yielding Pima S-1 cotton seeds are covered with a hard covering. As a consequence, germination has been slow and irregular.

Studies in the University of California at Los Angeles botany department by V. T. Walhood, U. S. Department of Agriculture agronomist, have demonstrated that a one-minute immersion in water at 185 degrees Fahrenheit does the trick. Most of the hard seeds of this extra-long-staple cotton germinate within two or three days following this treatment.

Irregularity in germination has been a particularly serious problem on cotton-planted land under irrigation in the arid Southwest, where most of the nation's extra-long-staple cotton is grown. Slow sprouting of seeds meant extra irrigation, so growers overseeded at considerable extra cost to insure adequate stands.

Science News Letter, May 5, 1956

PSYCHOLOGY

## Brief Glimpse of Object Affects Perception

➤ THE LENGTH of exposure time in which you can look at an object affects your perception of its shape and brightness, scientists at the University of Wisconsin report in *Science* (April 20).

When you look at a circular object, you tend to see it as a circle even when the disk is turned so that the image on your retina is really more like an ellipse. This is true if you look at the object for as long as a second. If, however, the time in which you can see the object is cut down to 0.01 second, what you see is more like the elliptical image on your retina.

Your perception of size is not affected in the same way. To determine this, subjects were shown a disk at distances from 12 to 192 feet, the disk being adjusted in size to cast the same-sized image on the retina. About the same results were obtained in continuous illumination and in a flash of only 0.0005 second duration.

Perception of brightness was found to be more in agreement with the physical characteristics of the object when viewed in very brief flashes of light than in continuous illumination.

Scientists reporting the experiment are Drs. H. Leibowitz, P. Chinetti and J. Sidowski of the department of psychology.

Science News Letter, May 5, 1956

GENERAL SCIENCE

## Engineering Schools Now Nearly Filled

➤ ENGINEERING COLLEGES are now near capacity and may soon be turning away potential engineering students.

A few have already found themselves unable to admit qualified students.

Many report they are using temporary facilities that make teaching and the campus reminiscent of the late 1940's when veterans from World War II swelled the nation's schools.

Engineering schools may soon have to advertise: engineers — vacancies filled, in contrast to the engineering companies who daily advertise: engineers — wanted. This was hinted in a report by the Engineering Manpower Commission of the Engineers' Joint Council.

At present, the report shows, total college enrollment is far ahead of the peak "G.I. Bulge" years. Engineering enrollment is very close to the highest levels reached in the late 1940's.

Engineering educators say that, although they were able to handle the situation after the Second World War, "they cannot do it again with equal success."

They point to three stumbling blocks making the two situations different:

1. The two groups of students have very different characteristics that tend to make the current group a larger problem.

2. The so-called "G. I. Bulge" had a foreseeable and predictable end, whereas the present increase is only the beginning.

3. Teachers of engineering are hard to come by because they are drawn from the same pool of engineering personnel for which competition is the highest in years.

One dean of a large eastern engineering college summarized the present problems by stating, "we would have to expand in all directions—facilities and manpower—if we were going to take in any more students and at the bottom of all this is money. Costs are going up very rapidly just because the cost of living in general is going up. Engineers are getting more expensive; engineering equipment is getting more expensive; buildings are getting more expensive. Unless we have very large appropriations for expansion I fear we will not be able to take in any larger freshman classes."

Science News Letter, May 5, 1956

MEDICINE

## Advise Magnesium Salts for D.T.'s

➤ MAGNESIUM SULFATE, better known as Epsom salt, may help overcome delirium tremens in chronic alcoholics, the American Medical Association said on the basis of a report by Dr. Edmund B. Flink of Minneapolis to the association's council on foods and nutrition.

The normal adult human body contains less than an ounce of magnesium, but a deficiency can produce muscle twitching, excessive nervousness, tremor, delirium, and even convulsions, Dr. Flink reports.

Chronic alcoholism appears to be an important cause of magnesium deficiency symptoms in humans.

The deficiency can be corrected with recovery from delirium tremens in some patients by giving magnesium sulfate.

Science News Letter, May 5, 1956

ASTRONOMY

## Martian Surface Between That of Moon and Earth

➤ THE SURFACE of Mars has a roughness between that of the moon and earth, two scientists told the National Academy of Sciences meeting in Washington.

Martian temperatures range from 77 degrees Fahrenheit at local noon to 94 degrees below zero Fahrenheit at night, Drs. John Strong and William M. Sinton of Johns Hopkins University reported.

They studied the infrared light given off by the two planets nearest earth, Mars and Venus. Both dark and sunlit parts of Venus, they found, had temperatures about 40 degrees below zero Fahrenheit.

No evidence for water vapor on Venus was uncovered in their survey. The Johns Hopkins scientists also scanned the moon with their equipment in order to eliminate effects due to the earth's atmosphere.

Science News Letter, May 5, 1956

# IN SCIEN

PSYCHOLOGY

## Criticizes Branding of Parents as Rejecting

➤ MOTHERS AND FATHERS of handicapped children are too often branded as "rejecting parents" by counselors who do not fully understand the term and its implications, James J. Gallagher of the University of Illinois' Institute for Research on Exceptional Children, Urbana, charged in a report to the National Education Association, Washington.

All parents, Mr. Gallagher believes, are entitled to be a little dissatisfied with one or more aspects of their offspring's personality, behavior or achievement without having these human feelings labeled as something psychologically revolting.

Some professional workers, Mr. Gallagher says, use the term parental rejection too freely, either because they do not know its real meaning or because they feel uncomfortable with some parents and want an excuse for avoiding contact with them.

Science News Letter, May 5, 1956

ENTOMOLOGY

## Insect-Made Insecticide Turned Against Pest

➤ MAN may soon be using an insect-manufactured insecticide to fight the same insect that makes it.

This turn in the war against insects results from studies identifying the repellent made by a southern cockroach to ward off its own insect enemies as 2-hexenal.

This same chemical compound gives tea much of its aroma and contributes to the odor of whale oil, Java citronella and lavender oil.

Studies made at the Quartermaster Research and Development Center, Natick, Mass., show that the cockroach, *Eurycotis floridana*, dispenses its insect repellent from a built-in spray gun. Tests also show that the insecticide is powerful enough to kill the same roaches that make it, when in a closed area.

"It is interesting to note," the scientists state in *Science* (April 20), "that *Eurycotis* was using this compound long before man recognized a need for insect repellents."

Tests are being conducted with derivatives of 2-hexenal to determine their worth as insecticides. The studies were made by Louis M. Roth, Walter D. Niegisch and William H. Stahl. *Eurycotis floridana* is a large, wingless cockroach that inhabits Georgia, Florida and Mississippi. It can spray its yellow-colored insecticide or shoot it out in drops that travel several inches.

Science News Letter, May 5, 1956

# CE FIELDS

BIOPHYSICS

## Virus Can Enter Cell In Tenth of a Second

➤ A VIRUS can inject itself into a cell in as little as one-tenth of a second or can take as long as ten seconds. This is among findings by Yale University scientists who are using physics to probe the nature of life.

The virus they studied is a bacteriophage, which preys on bacteria instead of animals and humans.

This virus, scientists generally have agreed, attaches to its host at the tip of its tail and leaves its outer coat outside while the inner part enters the cell and multiplies there.

The injection of the genetic material, which is the important reproducing part of the bacteriophage, or virus, may not be anything "extraordinary," the Yale scientists reported to the American Physical Society meeting in Washington.

They see it as a "restricted Brownian motion of a thread of material in a viscous fluid." Brownian motion is the quick dancing motion of minute particles suspended in a liquid that has been familiar to scientists for over a century.

The virus uncoils after it enters the bacterium, the scientists found from experiments in which the virus and bacterium were bombarded with deuterons just after the virus had entered the bacterium.

The Yale scientists reporting these studies were Drs. Ernest Pollard. Aadne Ore and Jane Setlow. Dr. Ore is on leave from the University of Oslo.

Science News Letter, May 5, 1956

PHYSICS

## Atom Smasher to Speed Electrons to Light's Speed

➤ AN ATOM SMASHER to speed up electrons to the highest energy ever produced in a laboratory, six billion electron volts, very close to the velocity of light, will be built jointly by Harvard University and Massachusetts Institute of Technology.

It will be called the Cambridge Electron Accelerator. If an electron moving at the speed of particles leaving this machine started around the world at the same time as a beam of light, it would be only five inches behind the beam in returning to the starting point.

The accelerator will be largely financed by the Atomic Energy Commission, as will the atom smasher to be built jointly by Princeton University and the University of Pennsylvania at Princeton, which will speed up protons to energies of three billion electron volts.

Protons, or hearts of hydrogen atoms, accelerated in it will have much higher intensities than presently available. When smashed into targets, these accelerated protons will produce many showers of heavy mesons.

Mesons are particles believed to act as the glue that binds atomic nuclei. Their masses are between electrons and protons.

The particles are all unstable and live only for fractions of a second. They occur in nature in cosmic rays but have only recently been produced in sufficient quantity for study in man-made accelerators, the cosmotron at Brookhaven National Laboratory and the bevatron at the University of California's Radiation Laboratory.

The Harvard-MIT electron accelerator is expected to cost the AEC $6,500,000, and the Princeton-Pennsylvania machine, $5,800,000.

Both machines will be used for basic research in high-energy nuclear physics, a field fundamental to understanding nuclear structure and forces.

Dr. M. Stanley Livingston, physics professor at Massachusetts Institute of Technology, will be director of the Cambridge Electron Accelerator.

Science News Letter, May 5, 1956

PHYSIOLOGY

## Cover Head in Arctic To Prevent Heat Loss

➤ IF THE HEAD is not insulated at least as well as the body, a man will get colder faster, the Federation of American Societies for Experimental Biology meeting in Atlantic City, N. J., was told.

In studies conducted for the Defence Research Board of Canada by Canadian physiologists, G. Froese and Dr. Alan C. Burton of the University of Western Ontario, it was found that more than half the body heat can be lost in cold weather when the head is hatless. The tests showed that the lower the outside temperature, the greater was the need for a hat.

A man at rest produces heat equal to that given off by a 100-watt bulb, the Canadians pointed out. When the thermometer reads ten degrees Fahrenheit above zero, about one-half this heat comes off the top of a hatless head.

Beards do not help much, either.

Last spring, using the same device as for testing hatless heads, the two Canadian scientists experimented with ten men from the "Hairy Apes' Club" of London, Canada.

They found a beard could appreciably lower heat loss, but the effect is often canceled out by an increase in the blood flow to the face because the skin under the beard has been kept warmer.

"The total effect was so small," they stated, "that the decision whether or not explorers and military personnel in the Arctic should grow beards will have to be decided by other considerations than just the value of a beard as thermal insulation."

Science News Letter, May 5, 1956

MEDICINE

## See Anti-Cancer Role For Pupation Hormone

➤ A POSSIBILITY of forging an anti-cancer weapon from the fruit fly's "growing-up" hormone appears in studies by Dr. C. H. Haddox Jr. of Louisiana State University Medical School, New Orleans.

Cancer is generally considered a condition in which cells fail to grow up and become specialized.

The hormone is called pupation hormone by scientists. It is produced in ring glands near the mouth of the fruit fly and changes larvae into the adult stage.

Flies with no growing-up hormone develop large abdominal pigmented masses resembling the black cancers called melanoma in man. Flies with ample production of the hormone do not develop these tumors, Dr. Haddox found. Flies given the hormone during their change to adults built hard restraining capsules around the tumors. Tumors stopped by the hormone grow rapidly when removed from the animals and placed in tissue culture lacking it.

Dr. Haddox is now trying to get enough of the growing-up hormone to test it on mice with cancer. It can be extracted from flies and moths, but it takes several pounds of the insects to yield enough hormone for a few experiments.

The findings were announced by the American Cancer Society, which supported the work. Collaborating with Dr. Haddox was Dr. Walter Burdette, now at the University of Missouri.

Science News Letter, May 5, 1956

MEDICINE

## Male to Female Heart Attack Ratio Changed

➤ WOMEN have lost their advantage over men with regard to heart attacks, it appears from studies by Drs. Kyu Taik Lee and Wilbur A. Thomas of Barnes General Hospital, St. Louis.

Heretofore doctors have reported that myocardial infarction from coronary thrombosis, the kind of heart attack President Eisenhower suffered, hits many more men than women. Ratios of three men to one woman or even seven to one have been reported on the basis of diagnosis of the condition.

A study of autopsies at Barnes Hospital since 1910 shows, however, that from 1940 to 1954 almost as many women as men had myocardial infarction. The ratio of male to female was 1.1 to one. From 1910 to 1939, however, twice as many men as women had myocardial infarctions, the autopsy records showed.

If the ratio has changed since 1940 in the general population as it has in the Barnes Hospital autopsy series, it is "of profound significance," the doctors state in *Archives of Internal Medicine*. (April).

Science News Letter, May 5, 1956

ZOOLOGY

# Widows and Tarantulas

**There are poisonous spiders in the United States, but deaths from the bite of a black widow, scorpion or tarantula are few and far between. Black widows are the most widespread.**

BY BARBARA TUFTY

**See Front Cover**

➤ NEXT TIME you are bitten by a tarantula, do not be frightened. He most likely will not kill you.

Although stout curved fangs can bite deep into your skin and inject a dose of venom, the bite is not deadly. All species in the United States are harmless to man.

Tarantulas can even make nice pets, if you happen to fancy that kind of pet, states Dr. Willis J. Gertsch, curator of the American Museum of Natural History's department of insects and spiders, and author of "American Spiders."

Usually all brown in color, the tarantula's powerful body is covered with long hairs that transmit a delicate sense of touch.

Tarantulas are not belligerent, Dr. Gertsch points out. They attack only when frightened or severely goaded. They will allow themselves to be picked up, gently handled and petted, without biting.

Native tarantulas live such hide-and-go-seek lives they often do not have the chance to bite a man. Only in the fall of the year, Dr. Gertsch explains, are they seen in any numbers, and those are males wandering in search of females.

**Venom Kills Insects**

Venom from the thorn-like fangs of these large hairy spiders easily subdues cold-blooded victims such as insects, lizards and snakes. Warm-blooded animals, however, most often suffer only local pain and irritation from its bite, and are not killed, unless the victim is a mouse or bird small enough to be overcome by the spider.

Studies of the indigenous tarantula show that when he does bite man, little more takes place than a breaking of the skin. Considerable pain accompanies the bite, however, but disappears in about an hour.

A typical southwestern U. S. tarantula has a body about two inches long and a leg span of about six inches. Some South American relatives are three or four inches long, with a leg span of 10 inches.

Tarantulas of the U. S. Southwest also live unusually long lives for spiders. The females live as long as 20 or more years, but the males usually die after one mating season. Male and female are often indistinguishable until they become sexually mature, females at ten, males at nine.

In making a cradle for her young, this tarantula first spins a round sheet of silk. She deposits several hundred eggs on it and covers it with a second sheet of silk, sewing the edges together to form a bag. She stands guard for six to seven weeks, as shown in the photograph on the cover of this week's SCIENCE NEWS LETTER.

The fear of death from black widow spiders is overrated, although these are the only spiders in North America considered dangerous to man, reports Dr. Gertsch, who has been associated with the New York museum for 23 years. He claims it is the only one in the United States that pays men to study spiders.

"In the whole history of this spider (black widow), the mortality of bites is the same as the mortality of rattlesnake bites in one year," Dr. Gertsch says. Or put it this way, you are as likely to die from a black widow bite as from a bolt of lightning on the 4th of July.

The neuro-toxic venom of the black widow acts upon the nervous system, producing violent pains and muscular spasms centered in the abdomen but extending to all parts of the body. If you are bitten by this jet-black fingernail-sized spider, see a doctor immediately, Dr. Gertsch cautions. Calcium gluconate probably will be injected into the skin, and after a few hours the symptoms usually disappear.

Found in every state of the United States, in Canada and South America, these shy, sedentary creatures with poor eyesight seek dark places, debris and rock piles to build their homes. They sometimes are found in dry cellars although they are not a house spider.

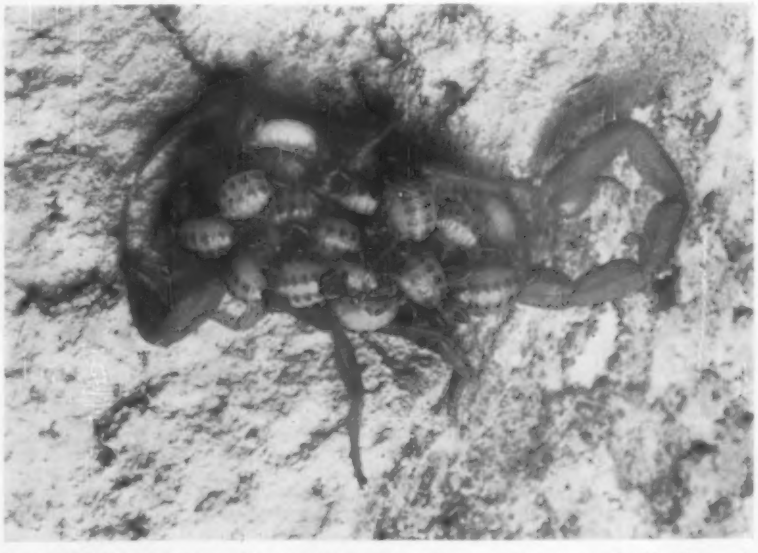
**Naming of Black Widow**

The black widow gets its name from the belief that females eat their males, although pairs really often live together very amicably. However, if the female happens to be hungry, she sometimes has her mate for supper, "though he is a spindly creature and hardly worth eating anyhow."

The black widow in the United States is also called the "hour glass," or the "shoe-button spider," names describing the bright red marking on the abdomen of the jet-black spider.

Three species of the black widow are found in the United States proper. The true jet-black widow, a close cousin from southern Florida called the "red-legged widow," and a third species, less gaudily marked, usually grayish or light brown.

Another member of the arachnid family, a family distinguished from insects by their



*SCORPION MOTHER WITH YOUNG—The scorpion is probably the only arachnid to give birth to live young, who clamber onto their mother's back immediately after birth and remain there until the first molting takes place, usually when they are about a week old.*

four pairs of legs, and the lack of antennae or wings, is the scorpion, which is thought to be the only arachnid that gives birth to live young.

This clan is the most venomous of the arachnids, although victims of scorpion sting are far more likely to die of fright than poisoning.

The earliest of all land animals, fossil scorpions have been found in Silurian rocks, 400,000,000 years old. Today's scorpion looks very much like its ancestor.

One species of scorpion has been found in fossil beds at Waterville, N. Y. The scorpion is considered by some students to be the first animal to adjust itself to land life in North America.

Right after young scorpions are born, they climb onto their mother's back and stay there until the first molting takes place, about a week or ten days after birth. The story that the infants then proceed to devour the body of their parent is the work of a rich imagination, Dr. Gertsch states. At this early age, he explains, their digestive system is not developed enough for them to devour anything.

### Do Not Suicide

Another story Dr. Gertsch calls a fable is the belief that scorpions commit suicide by stinging themselves when they are helplessly cornered or surrounded by a ring of fire.

Scorpions differ from spiders in that their abdomen is elongated to form a tail terminating in a poisonous sting.

Whip scorpions are different from true scorpions because they have no tail sting and no poison glands. Some have a slender, whiplike tail and an enlarged set of head appendages, fitted with sharp spines for grasping and crushing their prey.

When the "vinegaroon," a giant whip scorpion, is disturbed, a small gland at the base of the tail produces a liquid with a strong vinegar-like odor that volatilizes and causes a smarting of the eyes when sprayed at the small animals preying on the vinegaroon.

"The great majority of spiders," Dr. Gertsch reports, "and almost all those from the United States and other temperate areas, have a venom so feeble that its transitory effects are insignificant.

"In most instances, the bite is followed by local symptoms at the site of the punctures—burning, throbbing, and similar painful sensations, numbness, stiffness, and sometimes a very slight swelling. These symptoms usually persist for only a matter of minutes, or a few hours at the most, then disappear entirely — which indicates that the action is largely a local, mechanical one, and that the venom itself lacks harmful toxins.

"The severity of this type of injury usually does not exceed the sting of a wasp; only those individuals inordinately susceptible to the venoms of arthropods are affected in any important way."

Some spider poisons, however, do contain a toxin that causes a much more severe local and sometimes general reaction.

Science News Letter, May 5, 1956

NATURAL RESOURCES

## Man-Made Lakes Provide Extra Game Fish Supply

➤ ROD AND REEL ENTHUSIASTS have access to an additional 1,000,000 pounds of game fish a year from man-made lakes, the U. S. Department of Interior announced.

Each of the 81 lakes created under the Federal Aid program is expected to yield at least 150 pounds of game fish per acre annually.

The 7,908 acres of lakes were created jointly by Federal and state governments at an average cost of $1,000 to $3,000 per acre of water. Twenty-seven states have participated in the lake-making program.

Science News Letter, May 5, 1956

GEOPHYSICS

## Sun Controls Range of Cosmic Rays Detected

➤ THE NUMBER and kind of cosmic rays detected smashing into the earth's atmosphere are controlled by the sun.

Only when sunspots are at their lowest point in the 11-year solar cycle do scientists find the range that would be discovered in space, Dr. John A. Simpson of the University of Chicago said.

Variations in the sun's radiation, he told the National Academy of Sciences meeting, affect interplanetary space, which in turn controls the cosmic rays reaching earth.

Since sunspots are now increasing, the true range of cosmic rays will soon be unavailable for study for several years, Dr. Simpson said. The sun itself is responsible for some of the cosmic rays.

Sunspots moving across the solar surface reflect the migration of the sun's internal magnetic field, Dr. Eugene Parker, also of the University of Chicago, reported.

Churning gases in the sun's outside layer of about 60,000 miles create internal magnetic fields that float outward, producing the dark areas known as sunspots when they hit the sun's surface.

The earth's core is also churning over, and this motion creates its magnetic field, Dr. Walter M. Elsasser of the University of Utah said. He likened the movements to the swirling eddies found in the atmosphere, seen on weather maps as high and low pressure areas, on a very slow time scale.

That good conductors of electricity create their own magnetic fields was pointed out by Dr. S. Chandrasekhar of Yerkes Observatory, Williams Bay, Wis. The material in interstellar space, he said, has such a high conductivity that electric currents may be generated.

Science News Letter, May 5, 1956

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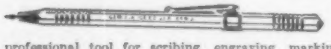

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# Books of the Week

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ARISTOTLE—A. E. Taylor—*Dover,* Rev. ed., 118 p., paper $1.00, cloth $2.75. The life of a great Greek philosopher and scientist.

AS YOU SEE IT: Twenty-four pictures to Stimulate Group Discussion of Social and Moral Problems, With Suggestions for Their Use — Catherine E. Steltz — *Teachers College, Columbia University,* Manual 26 p., paper, pictures and manual $2.95. Pictures are posed to suggest situations involving problems of marriage and family life, parent-child relations, in-laws, drinking, gambling, racial relations, law and order, etc.

AUTOMATA STUDIES—C. E. Shannon and J. McCarthy, Eds.—*Princeton University Press,* Annals of Mathematics Studies Number 34, 285 p., illus., paper, $4.00. A collection of papers dealing with various aspects of automata theory. The problem of whether it is possible to build a machine that will duplicate or surpass the functioning of the human brain is discussed.
(See page 277.)

CONSERVING AMERICAN RESOURCES—Ruben L. Parson—*Prentice-Hall,* 550 p., illus., $8.65. A lighter, livelier treatment of a serious subject intended to interest more Americans in the story of our natural resources and the ways by which they can be conserved.

THE DESCENT OF PIERRE SAINT-MARTIN — Norbert Casteret, translated by John Warrington —*Philosophical Library,* 160 p., illus., $4.75. The story of the exploration of a great cavern in the Pyrenees. In its depths, the author found what is believed to be the oldest statue in the world, a bear made of clay.

DINOSAURS, PREDATOR AND PREY: The Gorgosaurus and Lambeosaurus Exhibit in Chicago Natural History Museum — Rainer Zangerl — *Chicago Natural History Museum,* 13 p., illus., paper, 25 cents. Describing what this museum exhibit tells us about perhaps the most spectacular of creatures, which lived some 75,000,000 years before the coming of man.

EFFECTS OF CHLORINATION AND MICROORGANISMS AND CONSTITUENTS OF ASPHALT:—Frederick C. Sanderson and others—*Highway Research Board,* Bulletin 118, 48 p., illus., paper, 90 cents. Of particular interest to highway engineers.

FACTORS INFLUENCING TRAVEL PATTERNS — William J. Mortimer and others—*Highway Research Board,* Bulletin 119, 94 p., illus., paper, $1.80. Included is a discussion of how to develop a yardstick for measuring how many people want to go where.

FAMOUS PROBLEMS OF ELEMENTARY GEOMETRY—F. Klein, Raymond Clare Archibald, Ed., translated by Wooster Woodruff Beman and David Eugene Smith—*Dover,* 92 p., illus., paper $1.00, cloth $1.50. A new, corrected edition of a work first published 35 years ago. It discusses three famous problems, doubling the volume of a cube, trisecting an angle and squaring a circle.

GENERAL FEATURES OF ALGAL GROWTH IN SEWAGE OXIDATION PONDS—George F. Papenfuss and Mary B. Allen—*California State Water Pollution Control Board,* Publication No. 13, 48 p., illus., paper, 75 cents. Conclusion is that microscopic examination of a water sample can provide a useful tool for the operator of oxidation ponds. If the sample contains principally *chlorella,* the ponds are working at or over their capacity. If it contains a mixed flora, the plant could handle a heavier load.

HEATING, VENTILATING, AIR CONDITIONING GUIDE 1956—*American Society of Heating and Air-Conditioning Engineers,* 34th ed., 1176 p. plus catalog data section, illus., $12.00 plus postage. A reference work for the engineer.

HOW TO SELECT AND USE YOUR TAPE RECORDER — David Mark — *Rider,* 140 p., illus., paper, $2.95. As more people own recorders, more and more everyday uses are developing for them both in the home and in business. Here is advice on how to pick one adapted to your requirements.

IN THE DOCTOR'S OFFICE: The Art of the Medical Assistant—Esther Jane Parsons—*Lippincott,* 2d ed., 326 p., illus., $3.95. A handbook for the doctor's nurse, secretary or receptionist. It covers a wide variety of duties from first aid for the emergency that arrives while the doctor is out to preparation of his manuscripts for the publisher.

INDUSTRIAL RESEARCH LABORATORIES OF THE UNITED STATES—James F. Mauk with the assistance of Harold Peacock and Melvin S. Ruffner under the direction of Charles I. Campbell—*National Academy of Sciences — National Research Council,* 10th ed., 560 p., $10.00. The number of laboratories in this directory has increased in the 35 years since it was first published from 290 to 4,834.

INTRODUCTION TO THE THEORY OF GROUPS OF FINITE ORDER—Robert D. Carmichael—*Dover,* 447 p., paper $2.00, cloth $3.95. Introducing the student to concepts illustrating large domains of mathematics. An unabridged, student edition.

AN INVESTIGATION OF THE EFFICACY OF SUBMARINE OUTFALL DISPOSAL OF SEWAGE AND SLUDGE — Erman A. Pearson and associates — *California State Water Pollution Control Board,* Publication No. 14, 154 p., illus., paper, $2.00. This method of disposal is practiced in some form at almost every coastal city in the United States.

JULES VERNE: His Life—Catherine O. Peare —*Holt,* 123 p., illus., $2.25. A book for children telling of the life of a pioneer science fiction writer.

NEW WORLDS OF MODERN SCIENCE: A Treasury — Leonard Engle, Ed., with introduction by James R. Killian, Jr.—*Dell,* 383 p., illus., paper, 35 cents. Not an attempt, the editor explains, to pick the "best" writings on science but to select articles and papers, by outstanding writers, telling as simply as possible what modern science is doing. It includes also a little dip into what the future may hold.

THE PRACTICE OF PSYCHIATRY IN GENERAL HOSPITALS — A. E. Bennett, Eugene A. Hargrove and Bernice Engle and others—*University of California Press,* 178 p., illus., $4.00. Gradually, psychiatric wards are becoming an integral part of the modern general hospital. This book includes discussion of problems of planning and administration of psychiatric wards and day hospitals.

PROCEEDINGS OF THE WORLD SYMPOSIUM ON APPLIED SOLAR ENERGY, PHOENIX, ARIZONA, November 1-5, 1955—Lewis W. Douglas, General Chairman *Stanford Research Institute (As-*

*sociation for Applied Solar Energy)* 304 p., illus., $5.00. Containing highlights of symposium sessions and text of 30 papers by authorities on solar energy.

RESULTS OF THE ARCHBOLD EXPEDITIONS. No. 72 MICROHYLID FROGS FROM NEW GUINEA WITH DESCRIPTONS OF NEW SPECIES — Richard G. Zweifel—*American Museum of Natural History*, Novitates number 1766, 49 p., illus., paper, 25 cents. The four expeditions brought back from New Guinea and neighboring islands a remarkable wealth of reptiles and amphibians, including nine new species.

THE ROCHESTER REGIONAL HOSPITAL COUNCIL —Leonard S. Rosenfeld and Henry B. Makover — *Commonwealth Fund (Harvard University Press)*, 204 p., illus., $3.50. Report of an experiment in organizing medical care and hospital facilities on a regional basis.

THE SEA AND ITS RIVERS—Alida Malkus—*Doubleday*, 221 p., illus., $2.75. Fascinating stories about the Gulf Stream and other currents, the ocean's waves and tides, the varied life and the mineral wealth in the sea.

SIGMUND FREUD: Four Centenary Addresses—Ernest Jones—*Basic Books*, 150 p., $3.75. Commemorating the hundredth anniversary of Freud's birth, this work presents an analysis of the nature of genius.

THE SUN AT WORK: Newsletter of the Association for Applied Solar Energy, Vol. 1, No. 1 —Guy Benveniste, Ed.—*Association for Applied Solar Energy*, 8 p., illus., paper, quarterly, $2.50 per year. Intended to establish and maintain contact among those concerned with solar energy research. The principal article in this first issue is an account of the international meeting at Tucson, Ariz.

THE THIRTEEN BOOKS OF EUCLID'S ELEMENTS: Translated from the Text of Heiberg—Introduction and commentary by Sir Thomas L. Heath—*Dover*, 2d ed., in three volumes of 432 p., 436 p., and 546 p., illus., paper, $1.95 per volume, $5.85 for 3-vol. set. Republication of a classic in an inexpensive edition for students.

A WONDERFUL WORLD FOR CHILDREN—Peter Cardozo and Lilli Taylor, Eds.—*Bantam*, 244 p., illus., paper, 35 cents. Describing all the interesting things you can get for the asking or a small sum. Included in the list, are various materials available from SCIENCE SERVICE.

Science News Letter, May 5, 1956


**GOLF: Your LEFT SHOULDER makes the amazing difference!**

One of the most startling discoveries to emerge from wide research in the golf swing is that your game literally **hinges on your left shoulder!**

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His method has now been tested on a large scale and been found to yield simply astounding results! Not only do golf scores take a sudden drop, but with the new method good golf is a hundred times **easier** than bad— because it is **NATURAL** (not **strained**) golf.

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PHYSICS

## Design for Building Powerful Atom Smasher

➤ A DESIGN for building an atom smasher 10 to 20 times more powerful than the world's record holder scheduled to go into operation this year in Russia was reported to the American Physical Society meeting in Washington.

It could speed up atomic particles to energies of 100 billion electron volts, compared to the ten billion volts in the atom smasher Russian scientists are now finishing.

Dr. Lee C. Teng of Argonne National Laboratory, Lemont, Ill., said the "new principle and new magnetic field design" he devised would give a "continuous beam of charged particles at unprecedented high energies with unprecedented high intensity."

He suggests three stages for the accelerator. In the first, particles would be speeded to two billion electron volts, or about 95% of the speed of light. These particles would be continually transferred to a second accelerator with a ring-shaped magnet where they would be speeded up to 20 billion electron volts, or 99.9% of light's speed.

"Another transfer to a second, even larger ring magnet would give an energy" of 200 billion electron volts, he said.

Science News Letter, May 5, 1956

TECHNOLOGY

## Rubber-Tired Train Built for Arctic Use

➤ A TRAIN that rolls on 10-foot high tires, can be navigated by the stars, and can carry 50 tons of supplies will be used to develop military bases above the Arctic Circle.

The block-long vehicle, called a sno-train, is built to creep over deep snow on tires four feet wide and to travel in sub-zero temperatures. All 16 wheels are powered.

The sno-train was developed by R. G. LeTourneau, Inc., Longview, Texas. It looks more like a huge-wheeled duplex truck with three trailers than a conventional railroad train. A glass "bubble" was built on top of the engine for stellar navigation.

Science News Letter, May 5, 1956

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ORNITHOLOGY

## NATURE RAMBLINGS

*by Horace Loftin*

**The Exceptional Bittern**

➤ AN OLD ADAGE says that "the exception proves the rule."

Recently that adage has been tested and proven true. In Dutchess County, New York, a little boy was chased by a strange bird that terrified him. His screams attracted his mother and, little less terrified than her son, she chased the bird into a barn with a mop.

Later she contacted the state police, and one of the officers dispatched the offending bird with a pistol shot.

The story of this bird—the shy, seldom seen American bittern—"attacking" a human being was so out of the ordinary it was "big news." A bittern attacking and possibly causing harm is so exceptional that it proves the rule of his inoffensive nature.

What is true for the bittern is largely true for much or most of the animal life with which humans come into occasional contact. Any report of a person being bitten by a snake or chased by a wounded deer often gets front page treatment.

The reason, simply, is that animal attacks are so rare they excite curiosity. They are the exceptional cases that point out the general harmlessness of wild creatures to man.

Just how often do humans die of snake bite, for instance? In that land of coral snakes and fer-de-lances, Panama, Dr. H. C. Clark of the Gorgas Institute kept a tally of deaths by snake bite there over a period of years.

His astounding conclusion was that more people die by being struck by lightning each year in Panama than succumb to snake bites.

The famous animal photographer, Martin Johnson, was once asked if he did not often fear for his life during his expeditions into the jungles of Asia and Africa. He replied that he felt safer in the jungles than he felt in civilized lands. Shortly thereafter, Martin Johnson perished in the crash of a modern airliner.

Science News Letter, May 5, 1956

The panda, with the face of a raccoon, feet like a cat and body similar to that of a bear, is one of the rarest of *mammals*.

TECHNOLOY

## Atomic Energy Produces Better Rubber Faster

➤ BETTER RUBBER will soon be produced by atomic energy.

Two-million-volt electrons fired at silicone gum convert it to silicone rubber almost instantly without introducing chemicals that remain in the rubber and spoil some of its desirable properties.

The technique is credited with producing better rubber in two seconds than conventional vulcanizing methods yield in several hours. Its discoverers, Westinghouse scientists H. R. Sheppard, E. J. Croop and Dr. G. C. Gainer, said the method is not yet ready for commercial application.

They predict, however, that irradiation with high-energy electrons will become an important means of vulcanizing silicones on a large scale.

"Vulcanization takes place when the speeding electrons smash into the silicone molecules and cause them to arrange themselves in new patterns," Dr. Gainer said.

Science News Letter, May 5, 1956

## Questions

ASTRONOMY—What is temperature range on Mars? p. 280.

□ □ □

BIOCHEMISTRY—What chemicals help babies survive the birth shock of change to new environment? p. 279.

□ □ □

GENERAL SCIENCE—How is enrollment at engineering schools? p. 280.

□ □ □

MATHEMATICS—How can man's intellectual power be amplified? p. 277.

□ □ □

MEDICINE—How is ratio of male to female heart attack victims thought to have changed since 1940? p. 281.

□ □ □

PHYSICS—What are plasmons? p. 276.

□ □ □

PHOTOGRAPHS: Cover and p. 282, American Museum of Natural History; p. 275, Woods Hole Oceanographic Institution; p. 277, General Electric Company; p. 279, Stanford University; p. 288, Olin Mathieson Chemical Company.

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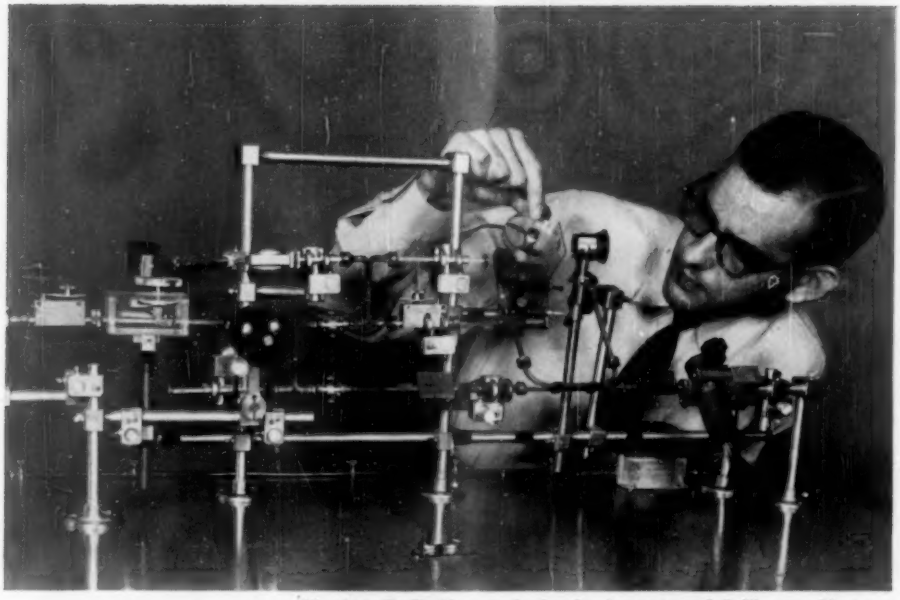


Physicist G. K. Farney checks the frequency of Bell's new klystron, which is located at far right. Tube's output is about 20 milliwatts.

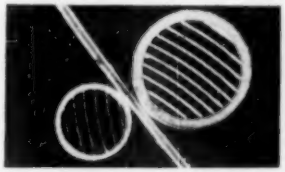
# Sixty billion vibrations per second

A great new giant of communications—a waveguide system for carrying hundreds of thousands of voices at once, as well as television programs—is being investigated at Bell Telephone Laboratories.

Such a revolutionary system calls for frequencies much higher than any now used in communications. These are provided by a new reflex klystron tube that oscillates at 60,000 megacycles, and produces waves only 5 mm. long.

The resonant cavity that determines the frequency is smaller than a pinhead. The grid thro ·h which the energizing electron beam is projected is only seven times as wide as a human hair, and the grid "wires" are of tungsten ribbon 3/10,000 inch in width.

G. K. Farney, University of Kentucky Ph.D. in nuclear physics, is one of the men who successfully executed the development of the klystron. Dr. Farney is a member of a team of Bell scientists whose goal is to harness the immense bandwidth available with millimeter waves . . . and to keep your telephone system the world's best.



Grids in new tube, enlarged 30 times, with human hair for comparison. Electronic beam passes through smaller, then larger, grid.

Wavelengths produced by the klystron tube are only .2 inch long—1/15 that of the transcontinental radio relay system.

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*FLAVORED FISH LURE has bacon rind or treated absorbent cottons inserted into its eye. The lure does not wiggle or spin, but travels in a wide sweeping spiral. It is available in 1/2, 1/3 and 1/6 ounce sizes and in all popular colors.*

Science News Letter, May 5, 1956

*PICTURE OWL scares off birds in the home garden. The scarecrow in this case is a rectangle of rigid vinyl sheet plastic seven inches wide and 12¾ inches long which has an owl motif. It can be strung from T-bars and will move in a breeze.*

Science News Letter, May 5, 1956

*DRAWER CABINET features a unique stacking principle that permits the homecraftsman to add or subtract drawers as desired. The individual drawer is made of heavy gauge clear plastic and can be divided into three compartments. No tools or hardware are needed for assembly.*

Science News Letter, May 5, 1956

*FASTENING TOOL, shown in the photograph, is described as the first of its type to be made in the U.S. It is designed so a worker can manually drive a fastener through one-quarter-inch steel. The tool's*

*leveling plate is detachable so fastenings can be placed in corners. It comes in ⅜ and ⅛-inch sizes.*

Science News Letter, May 5, 1956

*DISPOSABLE DUST MOP for the busy housewife is a chemically treated soft paper. The two-piece wooden handle and metal head holds 60 sheets. When dusting is finished, the used sheet is torn off and thrown away. The paper also contains a deodorizer and a disinfectant.*

Science News Letter, May 5, 1956

*PORTABLE WIRING SYSTEM has the ruggedness of permanent installations. Designed for the home workshop, it is made of U/L Approved 8-foot heavy duty extension cord with a two-way safety control switch and a twin block outlet with a mounting hole for attachment anywhere.*

Science News Letter, May 5, 1956

*WATERPROOF SUPERCOAT made from a silicone base is designed for brickwork, stonework, asbestos and concrete. Undetectable except by a water test, the silicone coating permits a porous surface to "breathe." This British product can be applied either by brush or spray.*

Science News Letter, May 5, 1956

*ELECTRIC BURNER for the laboratory heats up in one minute to a temperature of 800 degrees Centigrade. The German-made heater operates by the reflex of infrared rays. The burner is set in the middle of a funnel-like socket, whose walls are made of highly polished mirrors.*

Science News Letter, May 5, 1956

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Four countries, Cambodia, Laos, Thailand and Vietnam, have decided to merge their malaria-control program in an effort to rid the Indo-Chinese peninsula of its most expensive and debilitating disease, *malaria.*

Doron *body armor,* a new combat and police armor that is 70% effective against shrapnel and can stop a bullet from a .45 caliber pistol at close range, is now being produced in quantity.

Even the most severely crippled *arthritic* can, with proper rehabilitation techniques, be returned to some degree of self-sufficiency and independence, to self-respect and economic security.